10: d'Orleans--368-369 T-3 (1891-92) 1894 Laos
116, 249, 314, 513

[LSS: in the village of Muong Liep (Diap)] "In front of the huts pods gathered from the trees are drying, full of seeds which are surrounded by a silky down like those of some of our poplars. It is known as nghioue, and it is used here for pillows and mattresses.

I note, also, on the dryers, tobacco in shreds. [369] This plant grows well here, and one sees it everywhere about the villages, rank as weeds."

245 (bombax and callotropis), tamarind trees, jujube trees, cucumber trees, water chestnuts, etc.

In the north of Laos grow peach trees, plum trees, almond trees, [306] walnut trees, cherry trees, apple trees, pear trees, strawberry plants and medlar trees, the fruits of which are similar in taste to that of their counterparts in Europe, although they are neither as large nor as succulent as the latter.

On the edges of the forest, and sometimes even in the middle, there are also other wild fruit trees reminiscent of the plum tree, the cherry tree, the apple tree (a rose-apple tree with red or green fruits), the fig tree, the quince tree, etc. Their fruits have remained in a wild state or reverted to one because of a lack of adequate care, and are not edible. Their seeds, pits and stones have developed excessively, to the detriment of the pulp which remains tough, bitter or tasteless.

248 Finally, opium poppies, tea, ramie, hemp, etc. are cultivated
249 on the plateaus and in the high valleys.

Most European vegetables grow in Laos, in the gardens of the
241 Europeans. They are seeded at the end of the rainy season. Early varieties can be harvested and a new crop seeded well into July, but care must be taken to cover the beds during downpours, which occur frequently from May on.

134 The forests of Laos may have two characteristic forms, depending
137 on whether the soil is mountainous and composed of clay or limestone, or else flat or slightly sloped and sandy, rocky or stony. In the first case the soil has a high percentage of vegetable matter, is moist and rich in humus and consequently covered with thick forests (Dong or Pa). In the second case it has a low percentage of vegetable matter, is hot and poor in humus and is covered with light forestation (Khok or Pa-hang).

A table contained in the Appendices (No. XX) gives the nomenclature of some sixty varieties of trees on which we have information. In addition to the trees which we cite, we should also note the bamboos, rattans and banana trees.

There are some twenty varieties of bamboo, in which the stalks vary from the size of the little finger to as much as thirty or even thirty-five centimeters in diameter. They sometimes reach a height
824 of twenty meters. There are six or seven varieties of rattan of different grades and sizes, but they are used only for local needs. Among the many wild banana trees, a few varieties such as the "Kok-Koue-Kene" yield a sort of fiber rather like abaca.

137 [307] Although we are able today to evaluate the forest wealth of Laos approximately and to compute its immense commercial value,

Se-Bang-Fai. But studies are not yet sufficiently advanced for us to be able to give any useful information. 316

We have nevertheless felt that we should mention these deposits, in order to establish the importance of all this part of Laos from the point of view of mineral wealth.

[327] [Illustration at top of page]

CHAPTER VII

I

SCAVENGING

We have seen that the inhabitants of Laos are apathetic and little 461 inclined to work. They nevertheless find, although they go to scarcely any trouble, enough to supply their needs easily. 241

Indeed, with the exception of a few annual crops such as tobacco, cotton and indigo which are grown on the ever-renewed alluvia of the watercourses, the production of rice and of maize are the only occupations which require--and even then during a relatively short time--any degree of work or perseverance. We may mention the opium poppy, ramie, hemp and the mulberry tree merely as a reminder, for only a small part of the population devotes its time to these crops, which are still not at all extensive. [249]

Yet, it may be objected, the native has an easy life, dresses adequately, [328] lives in a house which is solid and comfortable from his point of view, has various tools and utensils, weapons, and sometimes even valuable cloth goods, jewels, etc. He spends money for celebrations and for offerings to the bonzes and pagodas. He pays taxes, he supports court costs which are often large with respect to the question at issue, and he is subject to the exactions of his mandarins to a greater or less degree. Finally, the commercial transactions of Laos involve quantities and sums which are quite high in comparison to the sparse population. 511 [438]

How are we to reconcile all these factors, and how is it that the Laotian, who produces so little with his labor, nevertheless has all he needs to get along on?

This is due to the fact that Laos is above all else a scavenging country. 314

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the plants are replanted a few centimeters [360] apart in a second seed-garden for growth. This procedure increases the plant's productivity quite appreciably.

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Since the nature of the terrain and the richness of the soil vary from one point to another, it follows that the yield from the ricefields is not uniform. By reason of these conditions and the varying amount of water which falls on the fields or is piped in, this yield varies from 40 to 90 parts for one part of seed, and from 15 to 25 piculs per hectare (1). The rice is harvested about four or five months after

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[101]

(1) In Cochinchina the average yield is from 28 to 30 piculs, and in Tonkin 44 piculs. But one should not lose sight of the fact that Cochinchina and Tonkin are much better favored than Laos from the point of view of irrigation, and that the Annamites are past masters in the art of farming.

transplanting.

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2) Terraced ricefields. The soil is worked in the same way in these ricefields, except that in some cases the land is turned over with a spade instead of plowed.

3) Mountain rais. In the year following the one when the land was cleared, the soil of the rais is cleaned and weeded. Then in June the rice is sowed, either broadcast or else by dropping a few grains at a time into holes made with a kind of bamboo dibble.

The rais are harvested in October and even in September in some localities. In general the yield from rais is from 90 to 120 parts for one part of seed and from 10 to 20 piculs per hectare.

Maize is sowed directly in straight furrows about March or April, and is harvested in July.

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TOBACCO. Tobacco (Ia-Doute) is widely consumed in Laos, where everyone smokes. It is also an excellent commodity for trade and export. It is cultivated on a large scale on the banks and islands of the Mekong from Pak-Lay to a point below Pone-Pissay. Production from the tobacco fields in these regions not only supplies local needs, but also those of all of Upper Laos and part of Lower Laos and provides tobacco for export to Siam and Cochinchina.

[439]

[361] In addition to the foregoing, almost the whole population along the banks of the Mekong and the lower reaches of its tributaries also grows tobacco for its own use and for the inhabitants of the interior. The tobacco which is most prized for its high quality, however,

249 is that grown in the regions which we have just mentioned. Because of its origin and the name of the two main distribution markets of the trade, it is called Nong-Khay or Vien-Tiane tobacco.

We do not have exact data on the annual production of tobacco in Laos, because of the excessive fragmentation of the plantings and the absence of a crop registry. But information gained from commercial statistics enables us to say that in 1898 exports from the Paklay-Pone-Pissay region reached more than 42 tons. Also, if we attribute to each [276] inhabitant two grams of tobacco per day (this is not an excessive figure) or ten grams per family of five, we find that total consumption in Laos would be from 340 to 345 tons annually, or a total production of about four hundred tons (1).

(1) See Appendix XXIII.

[435 439] The export sale price varies from fifty to a hundred francs per hundred kilograms, depending on the quality.

248 COTTON. Cotton, a herbaceous and annual plant, is cultivated almost everywhere in Laos for local consumption, and particularly in 439 northern Laos for export to Yunnan. In fact, this product is almost the only return cargo for the mule and horse caravans which come in each year from Yunnan-Fou, Tali, S'semao, etc. with tea, furs, iron and copper pots, knick-knacks, etc.

248 The farming methods in northern Laos are as follows. Seeds are placed in pairs in holes which are about ten centimeters deep and spaced at varying distances depending on the region. Stony ground is preferred, on which the brush has been burned away both to clear the land and also [362] to fertilize the soil. No other fertilizer is used except the ashes of the vegetation which covered it.

The seeds are sowed in April or May and usually germinate a few days later. The plantings are harrowed and weeded twice each season, and harvesting is usually finished in November. The cotton is of a mediocre quality, with short staples, but despite this defect it is highly sought-after, as we have seen above, by the Chinese caravans which buy all of the available supply each year at the chief local markets. The height of the plant at full yield does not exceed sixty centimeters, and the yield per kilogram of bolls averages thirty percent or about 300 grams.

248 In southern Laos the cotton fields are small in extent, widely 311 scattered and formed chiefly of narrow strips of alluvial terrain on the

banks of the Mekong and its larger tributaries. 248

It is also grown on former rais in the highlands of southern Laos. 311

The climate of the Mekong valley is essentially favorable to the production of cotton, but the extent of the plantings has so far been limited, because of the lack of outlets, to what is strictly necessary to satisfy current local consumption.

Farming methods, in the lowlands of Lower Laos as well as in the highlands, are extremely primitive. The brush is cleared from the piece of land chosen, then without either weeding or fertilization the seeds are sowed in holes made with a dibble. 248

Two varieties are grown:

1. The large-flowered variety (Fai-Dok-Niai), which is preferred as being more productive and having fewer seeds. It is sowed at the end of the rainy season, usually in October, and harvested in March. This variety is cultivated only on the banks of watercourses. Its average height is one meter.

2. The small-flowered variety (Fai-Dok-Noi). It is cultivated only on higher ground, on former rais or in mountainous regions and is similar to the variety found in northern Laos. [363] It is sowed and harvested at about the same times as the above, that is to say from May to July for sowing and November or December for harvesting. Its average height is .7 meter.

It is difficult to determine the yield per hectare, in view of the fact that the cotton fields are irregular and variable in shape and size. On the basis of results in a certain number of fields which were measured separately, however, we may hazard the approximate figure of 200 to 400 kilograms of raw cotton per hectare, depending on the type of soil and its disposition.

On-the-spot purchase prices vary appreciably between the two parts of Laos. In the northern part, for example, the second-grade cotton bought by the Chinese sells for 35 to 40 francs per hundred kilograms. [435]

This crop should be developed further, and in a later paragraph we shall outline the steps which might be taken (1).

(1) Based on the reports of the Superior Commandants of Upper and Lower Laos. [113]

SUGAR CANE. Sugar cane is cultivated everywhere, both in the hills and on the low prairies. It is used only for local consumption, 249

249 either in the natural state or in the form of black, pasty, molasses-laden sugar.

There are several varieties, the chief of which are the heavy, green cane which is highly cellulated, and the small violet-colored cane with joints closer together, which is fuller than the first.

Farming methods do not differ from those used in other countries. Cuttings are planted, and the plants are topped if they show a marked propensity to excessive leafy growth.

257 To manufacture sugar, the cane is crushed between two vertical
407 cylinders driven by two wooden gears of a most ingenious construction. A buffalo turns the whole by means of a crossbar or shaft, the end of which is attached to its neck and constitutes a whim. Sometimes the cane is crushed between two pieces of stone or hardwood, one of which rests on the ground while the other [364] is applied on top of it by means of a wooden lever. One or several persons work the other end of the lever with all their weight and move it up and down in a series of
[439 jerky motions. The juice extracted from the cane is placed in large
415] cast iron cauldrons shaped like cupels, which are imported by Chinese merchants. Condensation takes place over an open fire laid in primitive hearths which are cut into the ground itself, if it is clayey. When the syrup reaches the desired degree of thickness the whole mass is poured into rectangular or circular molds made of wood or bamboo. After cooling the loaves of sugar which come from the molds, and which are from three to six centimeters thick, are wrapped in dry leaves. They are transported and sold in this form. The cane itself is called "Oi" and the sugar "Nam-Oi" or, literally, water of cane.

[276 The Laotians do not refine alcohol from the juice of sugar cane,
101] and are even ignorant of the initial refining stage which the Annamites use and which produces brown sugar.

[435 The price of sugar on the markets of Laos varies from one point to another, and transactions involve small quantities only. Statistics do give evidence, however, from which market prices of 35 to 50 francs per hundred kilograms can be deduced.

249 INDIGO. We have seen above that the Laotians use the indigo-bearing properties of certain plants which grow wild in the forests in order to dye cloth goods blue. They also produce a variety of indigo, the Indigofera tinctoria, which is similar to the variety found in Bengal. The plant itself is called "Kok-Kame" and the extract or dye "Nam-Kame

149: Reinach--268 G-3 (no date) 1901 AM1 Indochina
Laotians AM8

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Indigo is grown on the banks of the Mekong and other rivers which are covered by water each year, so that when the waters withdraw they leave behind an alluvial deposit which is quite rich in organic vegetable matter.

The seeds are planted when the rains have completely ceased, that is to say between October and December, depending on the region, and somewhat earlier in the North than in the South.

Germination takes place within a few days, six at the most, and the ground is harrowed and weeded immediately after. At the end of [365] three months the first cutting is made, and this is the most productive one in terms of indigotin. A second cutting can sometimes be made two months later. If the rains are late it is even possible to make a third cutting seven months after the seeds have been planted.

The yield from the plants varies according to the type of terrain, the season and the region. Since plantings of this crop are far too scattered, it is at present impossible [Illustration here] to give the proportionate yield per hectare in terms of stalk weight or volume and weight of liquid indigo and dry indigo, as well as the indigotin content of this product.

Up to the present time this crop has been grown in Laos only to satisfy the country's own needs, without any view toward exporting the product. In view of the diminution of the harvests in Java and Bengal in the last three years, moreover, a diminution which coincides with the appearance of synthetic indigo or industrial indigo, we do not believe that any advantage is to be gained from encouraging the spread of this crop.

CASTOR OIL. Castor oil plant production is limited, since its oil [366] is used only for lighting bonzeries and as a hair dressing. The ordinary variety which grows spontaneously on the banks of watercourses and in cool places is found in Laos, as well as the red castor oil plant and the arborescent castor oil plant. The oil is extracted from the beans by means of pressure.

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RAMIE. Ramie or the Chinese nettle, China grass, is a kind of urticaceous plant grown chiefly in the highlands by the Phou-Thais, the Khas, the Meos and the Yaos. It is called "Nhia-Gay" in northern Laos and "Pane" in southern Laos.

In April the old roots are buried about .7 meter apart. A month later clumps of twigs sprout and grow.

149: Reinach--270 G-3 (no date) 1901 AM1 Indochina
Laotians AM8

244

GROUND NUTS. Only the subterranean varieties of ground nuts, or peanuts, are found in Laos. The inhabitants call this plant "Mak-Thoua-Dine," which means, literally, Fruit of the ground bean. Peanuts are not used for their oil, but are eaten boiled, roasted or with certain pastries in which they are incorporated. They are fed to convalescents as a tonic and restorative, doubtless because of their high nitrogen content.

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COCONUT AND SUGAR PALMS. The former is called "Kok-Mak-Phao" and its fruit is called "Mak-Phao." The second is called "Kok-Mak-Tane" and its fruit the "Mak-Tane." The sugar extracted from the "Mak-Tane" is called "Nam-Tane."

These two trees are cultivated almost everywhere in the environs of villages.

Coconuts are consumed on the spot, either fresh or dried. In the latter case their meat is used to make an edible oil which is quite good when newly made, or else it is shredded and then used to make a kind of sugar cream. Coconut meat is one of the constituents of carry.

The number of coconut palms in Laos is not great enough [368] to provide for local needs and still leave any over for export of their pulp, which is known commercially as copra. Sugar palms are used only for the needs of the local population. The sugar which they yield is whiter than cane sugar as extracted by the Laotians, and so the natives give the name of "Nam-Tane" to the crystallized European and Chinese sugar, because of its color, and never apply to it the name "Nam-Oi," which designates their black cane sugar.

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BETEL PALMS. Betel palms are grown wherever the altitude permits, and are even found at heights greater than eight hundred meters. [Illustration alongside text here] The betel palm, which is called "Kok-Mak," produces the "Mak" nut with the veined meat which enters into the composition of the national masticatory together with betel, lime, etc.

[348]

When it reaches maturity the betel nut is picked and prepared in two different ways in order to be either consumed on the spot or transported to parts of the country which have none. There is even a small export trade, but so slight that we need only mention it.

It may be preserved whole after the floss envelope from which it is extracted has been dried, or else it may be cut up into [369] thin

249 segments, together with its envelope, while still green. The segments
276 are threaded in groups of sixteen on plant thongs and then gathered in packets of fifty or a hundred thongs. The packets are hung up at home near the hearth, and the smoke gives them a brownish color, dries out the nut completely and soon makes it insect-proof.

438 Since every Laotian, with only a few exceptions, has betel palms around his house, trade in betel nuts takes place only in the large mar-
276 kets, where there are packets of dried nuts which a few small merchants have collected. Within the country these packets are sold according to their number of nuts, and yet statistics give sale prices by weight, at figures varying between twenty and forty francs per hundred kilograms. It is probable that the latter figure applies to whole nuts, and the former to packets of nut segments.

249 BETEL. The betel leaf, which gives its name to the well-known masticatory, is a product of the Piper Betel which is grown everywhere in Laos and for which the trunks of betel palms generally serve as a support. It is to the cultivation of this plant that the Laotians devote the most attention. The soil is manured and weeded, the foot of the plant is surrounded by an earth mound, and the plant itself is protected against animals by a wooden enclosure. The betel palms around which the betel plants climb and twine profit from the care given the latter and generally produce a better harvest than trees which have been left alone. In order to water the betel plants, which often reach a height of seven or eight meters, the natives have devised a bamboo syringe, one end of which has a rounded nozzle pierced by small holes.

245 LAC. The tree on which the insects which secrete sticklac grow is called "Kok-Mak-Thoua-He." It is a biennial of the leguminous family and Acacia genus. Its fruit is a small edible bean, rounded and veined, which is contained [370]in groups of five or six in a soft, semi-parchmented pod. During its two years of life each shrub produces more than a million beans or seeds. A few of these are kept for seed, and the rest are consumed on the spot.

The cultivation of the shrub and of sticklac comprises two operations seeding the "Kok-Mak-Thoua-He" and inducing colonies of coccus lacca to settle on its branches. The aphids of this insect produce the tinctorial matter called "Khang-Deng" or, literally, Red wax.

245 Here, as a sample, is a table showing cardamom production on the
435 plateau of the Bolovens during the last few years, with purchase and sale prices:

Year	Production in kilograms	Price per hundred kilograms	
		On the plateau	At Pnom-Penh
		Purchase	Sale
		francs	francs
1895	120,000	37.50 to 50	66.20 to 85.60
1896	48,000 to 60,000	50 to 58.30	70 to 93
1897	96,000 to 108,000	50 to 62.50	77.80 to 97.30
1898	270,000	50 to 66.60	85.60 to 136.
1899	216,000	54.10 to 75	77.80 to 136

249 [375] MULBERRY TREES. There are two kinds of mulberry trees
231 for feeding silkworms in Laos: the annual mulberry and the shrub or perennial mulberry (1). In Laotian the latter is called "Kok-Mone,"

(1) It is no doubt to be identified with the multicauline mulberry and the white or Chinese mulberry.

[311] which may be translated literally as silkworm tree.

The mulberry is grown near villages, on the banks of watercourses. Oftentimes the foot of an arborescent mulberry will even be inundated during the rainy season, and it has been noted that the worms which devour the leaves of these trees are more subject than other worms to the diseases of the species and produce less silk. It is therefore probabl that excess humidity is harmful to the mulberry. But if at the present time most of these shrubs are planted in humid regions, this is due to the fact that in many places the higher ground has been abandoned and the inhabitants have settled in the bottoms of valleys. It will be understood that the natives like to have the gardens of mulberry trees

near their silkworm breeding houses, but it is unfortunate that the new conditions in which the trees are placed should have an adverse effect on silk production. On the plateaus and in the high valleys, in the vicinity of land once occupied by villages, there are many mulberry trees which have continued to survive. They send out new leaves again even after the annual burnings of the forest clearings, and bear leaves which are vigorous and have a more pithy appearance than those of their fellows in the low, humid parts of the country. They are also said to be preferable for feeding silkworms (2).

(2) See Appendix XXIV.

Local consumption absorbs the greater part of the silk production, for the majority of Laotians, both men and women, use it in making the garments which they wear.

We do not possess exact data on the total production of silk in Laos. It has been estimated at about twenty tons annually. The price varies from 400 to 500 francs per hundred kilograms.

OPIUM POPPIES. The opium poppy is cultivated by the Yaos and the Meos, in northern Laos. Towards the end of the rainy season, [376] in September, the poppy seeds are sowed broadcast on land from which maize has just been harvested. Germination is activated by the last rains of the season and the plant flowers at the beginning of December. Harvesting is done shortly after the petals have fallen.

Closely spaced lengthwise incisions are made all along the surface of the capsule, allowing the plant juice to escape. It coagulates upon contact with the air and is collected daily until the plant has been completely exhausted (1).

(1) See Appendix XXV, report of M. Lussan, Cochinchina customs agent. The latter was sent on a mission to Upper Laos to experiment with growing opium poppies by less rudimentary methods than the ones in use among the Meos and the Yaos.

[654]

PAPER TREES. There are several trees in Laos whose bark is used to make paper. They seem to be of the mulberry type and are called "Kok-Sa."

The paper is made by hand on forms, by extremely rudimentary methods. Its manufacture occupies several villages of northern Laos.

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289 The amount of paper produced is hardly significant, and is limited to local needs.

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311 TEA. Tea is the most important crop of the Sib-Song-Pahn-Na and the Burmo-Shan States on both banks of the Mekong. The regions of production are included between 21° 30' and 22° 30' N. latitude and between 97° 30' and 99° 40' E. longitude.

[175] The greater part of these regions, that is to say those situated on the left bank of the Mekong, belonged to us by the terms of the 1887 Franco-Chinese treaty of Tien-Tsin. But because of our slowness to occupy these territories England inherited the rights of Upper Burma and ceded them to China, and finally only the two Muong-Hou remained in our possession.

[563] Unfortunately, the small tea-growing region left to us is not only the least productive, but also the one in which tea-growing has degenerated and is no longer practiced except by the Khas.

[377] Yet the climate of the Muong-Hou is similar to that of Man-La, which is located thirty kilometers to the west and whose tea has the same reputation as those of I-Hou, I-Bang, Muong-Hing, Muong-Pang and Muong-Ya[illegible], all of which are known as "S'semao and Pou-Eurl Teas." Furthermore, the altitude and configuration of the soil, the nature of the terrain and the varieties of tea plants are all similar in our territory of Muong-Hou and in that of Man-La. But as a consequence of various circumstances and especially of a long interruption in cultivation between 1884 and 1893, most of the tea plants have not been pruned. They have reached a height of more than six meters and the tea which they produce is almost valueless (1).

(1) See Appendix XXVI.

The average production of the whole tea-growing region has been estimated at from 600 to 660 tons. This tea is exported to China, to Burma, to Laos, to Tonkin and to Siam. In 1891 and 1892 France imported a trial shipment of 6,000 kilograms, but the transaction was not repeated because of a rise in transport costs and customs duties which did not leave a large enough profit for the importer.

[435] In the regions of production prices vary, depending on quality, between 75 and 150 francs per hundred kilograms.

The teas which come from this region meet with little approval in Europe, because they lack the various aromas which the Chinese

Sugar cane. The production of sugar cane, which is still not very significant in Laos, deserves to be encouraged. Later on when this crop had been developed, the Laotians might be trained in the methods of the first stage of refinement. They would then be able to produce gray muscovado and sugar candy, which are easily exportable. 241 185

Southern Laos is the part of our possession which would lend itself [386] best to the extension of this crop. Although of secondary importance, it is nonetheless deserving of attention.

Benzoin trees. Increasing the number of trees which are producers of this precious resin is again a task for the administration. After a serious study of the conditions of growth of the plant in Laos, of its habitat and of the nature of the terrain best suited to it, it would be possible to set up seed gardens designed to supply young plants either to the natives or to Europeans who settled in the country and were interested in this crop. It yields a rich product, which brings a high price on the market. Benzoin is, in fact, widely used in perfumes and in the manufacture of varnishes.

Lac trees. All who are acquainted with Laos are unanimous in agreeing that increasing the production of sticklac is one of the main factors in increasing the country's wealth. What, indeed, could be more simple, thanks to the easy and rapid multiplication of the "Kok-Toua-He," the tree which grows almost without care and lends itself so well to the establishment of colonies of coccus lacca, the producers of a superior quality of gum lac?

Cardamom. It would seem that experiments with growing true cardamom, as it is grown in Cambodia in the province of Pursat, might be attempted in Laos. The natives would have everything to gain from giving up the cultivation of wild cardamom for that of true cardamom, since the latter brings from five to ten times more than the former on the market of Pnom-Penh. 249 263 438

Until such time as this precious seed is introduced into Laos, it will be well to extend and encourage the cultivation of the present variety of cardamom. All those who have engaged in the production and commerce of this seed (1)--the mountainfolk who grow it, the

(1) It is much sought-after by the Chinese, who use it as a condiment as well as in pharmaceutical preparations.

249 263 438 Chinese and Laotian middlemen and even the few European merchants--have found that it brings in rewarding profits. Indeed, by exporting this product the latter are assured of an almost certain gain of 20 to 30 percent.

248 439 [387] Ramie. There is also much to be gained from increasing the production of ramie or Chinese nettle. It is assured of an outlet in Cambodia, where it sells for as much as 80 francs per hundred kilograms.

249 185 Cinnamon. The extension of the plantations and gardens of cinnamon trees already in existence in the province of Vien-Tiane deserves serious encouragement. The bark of these trees is a valuable product which is much sought-after in China and in Europe.

276 656 Opium poppies. The Government of Indo-China, which is both the preparer and seller of chandoo or opium for smoking, is the party which would gain most from obtaining the raw drug on French territory. It is, indeed, still dependent on British India for this product, and can acquire it only on extremely disadvantageous terms.

Since much time must still pass, however, before the Meos and the Yaos give up their age-old methods, it would be essential for the intensive cultivation of the opium poppy to be undertaken by Europeans on behalf of the administration. This would be possible if there were a guaranteed labor supply in the form of Chinese coolies, who would be enlisted primarily for the greater part of the work, and of native specialists who would deal only with scarification of the capsules, harvesting the opium and the first stage of its preparation.

These delicate operations are the ones which the Meos and the Yaos like best, but they dislike plowing, fertilizing, weeding and irrigation, all of which tasks are indispensable for obtaining a high yield of capsules and consequently of the raw drug. It would therefore be best to entrust this heavy work to foreign coolies, and it is probable that after a certain time they too would be capable of extracting the opium. Impelled by their example, the natives would doubtless then be seen to break with their prejudices and devote themselves also to intensive cultivation so as to reap its full benefits.

The role of the administration would then be at an end, and it would gradually diminish its intervention as free cultivation of the poppies increased.

[435 Raw opium which is produced locally or which comes from [388] neighboring countries is worth 22 francs, 50 centimes to 32 francs, 25 centimes per kilogram, depending on quality, in northern Laos.

314 lose forever the plant which they have mutilated. The Superior Resident in Laos has had studies made of the methods of extraction which can be employed without danger, and he proposes to make 314 them obligatory within a short time. As of the present time, he 656 has issued the following decree relative to the exploitation of rubber:

"Any native desiring to engage in harvesting rubber on Laotian territory must obtain a special authorization which will be conferred by the chau-muong if the interested party resides in the muong where he desires to operate, and in all other cases by the Government Commissioner of the province.

[65] [140] "This authorization shall indicate, in as clear a manner as possible, the limits within which exploitation is to take place, the methods of extraction which may be employed and those which are prohibited, and finally the point where the rubber must be submitted for checking and payment of the duties which represent land tax before it leaves Laos.

"Businessmen and corporations desirous of sending their paid agents into the regions of rubber production may address to the Government Commissioner a collective request, in which the names and residences of such agents shall be listed and in which they shall agree to abide by all regulations which the authorities shall deem it useful to prescribe. In return they shall be sent permits drawn up in accordance with the provisions of the preceding article, these permits to be delivered to their employees.

"The above authorizations shall be granted entirely free of charge.

"Contraventions to the present decree shall be prosecuted and punished by the provincial tribunals in accordance with the laws and customs in force in Laos." (Decree of September 21, 1900.)

[141]

APPENDIX XXIII
NOTE ON TOBACCO

• 249 Growth and preparation. Tobacco is best grown on the banks of watercourses which are left dry each year when the waters fall and which are fertilized by deposits of alluvia.

Tobacco is also grown, however, on the banks in old alluvia which are no longer inundated by the river, but where an ample supply of water is assured by the presence of a nearby stream.

134 In Laos the soil which is suited to tobacco is light and sandy and 249 contains a high proportion of potash, relatively little lime and an average quantity of nitrogenous vegetable matter.

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average quantity of nitrogenous vegetable matter.

The tobacco of the region of Pak-Lay and Pone-Pissaye, although it has been subjected only to agricultural fermentation, is nevertheless of good quality. It is low in hygrometric content, keeps easily, burns well at a low temperature and, although quite strong, has a pleasant odor.

In the alluvia which are covered every year by rising water, tobacco is grown without previous fertilization. Not until two weeks after transplanting are the holes in which the tobacco plants are set filled with a compost made up of buffalo, ox, horse or other manure which has been mixed with paddy husks. On ground which is not inundated every year the same procedure is followed, but care is first taken to burn all existing grass and shrubs on the soil where they stand, so that their ashes will communicate to the soil the fertilizing elements which they contain.

Seeding. Tobacco is sowed in a seed-garden during the month of September, shortly before the rains are over. Germination takes two weeks, after which time the seminal leaves spring out of the ground.

During this time the ground has been prepared for transplanting. Holes from 10 to 15 centimeters in diameter and 20 to 30 in depth have been dug [142] in a triangular arrangement, and spaced from 60 to 90 centimeters apart. The soil taken from the holes is left in mounds around the edges.

Transplanting. A month after its emergence from the ground, when the plant has three or four well-formed leaves, it is transplanted into the holes. Then the latter are almost entirely covered with segments of banana stalks.

Two weeks after transplanting the tobacco plant has seven or eight leaves. Then it is that the holes are filled with the compost of which mention has already been made, and that the plants are watered.

Flowering. Two and a half months after transplanting (70 days), when the tobacco is beginning to flower, all the heads of the plant which have begun to flower are cut off. Floral buds then grow at the axil of each leaf, and these are also cut off as they appear.

Maturation and harvesting. Two months after the start of flowering, that is to say four and a half months after transplanting and five months after sowing, the tobacco leaves begin to show brownish-yellow spots. They are then ripe, and they are harvested as they reach complete development.

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This operation always takes place towards the end of the afternoon when the heat has subsided, and the harvested leaves are left on the ground at the foot of each plant until dusk.

During the last two months particular care is taken to weed the tobacco fields, and worm-eaten or stunted leaves are removed from each plant so that only eight to twelve good leaves are left on each plant. When all the leaves have been harvested the plants are left to go to seed and provide seed for the next season.

Yield. Deducing an average from many tobacco fields which we have examined and the content of which varied greatly, we may estimate that a hectare planted in this manner contains from 15,000 to 25,000 plants depending on the spacing which has been used. This spacing varies with the richness of the soil.

Agricultural fermentation. After harvesting the leaves are placed on top of one another in piles of five, and these packets (Phoc or Kam-Nung)are laid out either on a mat or on earth which has been beaten hard and dried by fire, under a shed or under the house. The packets are laid side by side in a circle without overlapping, so that the leaf-stalks form what might be called the spokes of a wheel with the points of the leaves towards the center. The first layer thus placed represents a disc, at the center of which a small space has been left empty for aeration. A second layer of packets is then placed over the intervals of the first, that is to say that each pack in this layer is set astride two halves of two other packs in the bottom layer. This process is continued until a cylindrical stack some .9 meter to 1.2 meters in height is formed.

Fermentation lasts three days, releasing heat which may be as high as 40° to 45° during which the leaves turn completely yellow.

[143] During this operation care is taken to shift the stack several times, moving the top and bottom layers to the middle of the stack where the heat is greatest. The quality and strength of the tobacco are then tested simply by examination and by odor. The quality, which varies from one year to another in respect to appearance and taste, is then pronounced very good, good or ordinary.

Sorting. Sampling. Making into plugs. The purpose of sorting is to match up tobacco leaves in accordance with their color and quality. Then the outer part of the leaf-stalk is entirely removed simply by pulling it off, beginning at the base.

The tobacco may then have any one of three appearances, each one constituting a different sample lot:

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1. Dark in color and with a strong taste. This lot comes from the upper part of the plant and is represented by the smaller leaves, which are sweet and supple.

2. Yellowish-brown in color and with an average taste. This tobacco includes the leaves from the middle part of the plant, which are somewhat larger than the preceding but less sweet and supple.

3. Yellow in color and less strong in taste. This last sample lot is made up of the leaves from the base of the plant, which are large, somewhat thicker and rougher than the preceding.

The leaves are matched in accordance with their color, surface and thickness, and then joined in packs of ten for the first sample lot, eight for the second and five for the third. They are rolled into plugs, and the tobacco is then ready for cutting.

Cutting and packing. The cutting operation is done on a horizontal bench ending in a vertical riser. This riser is pierced by a circular hole, the diameter of which is equal to the size of the plugs to be cut.

A plug is placed on the horizontal bench and its end stuck through the hole. It can then be advanced by stages with the left hand, the size of the stages to be determined by the degree of fineness desired, which depends on the type of sample lot. (The first number is as fine as Egyptian tobacco, to give some basis for comparison.) A special knife with a thin blade which is somewhat concave on the inside and is well sharpened is maneuvered with the right hand and rubs along the riser on the outside of the hole. It cuts through the plug as the latter is advanced along the horizontal bench, cutting diagonally like the blade of a guillotine.

When cut the tobacco is in the form of a flat, thin, filamentous web, and it falls into a kind of winnowing-basket. The strips of cut tobacco are carefully collected and spread out full-length on bamboo wattles, then exposed out of doors to sun, mist and dew, both day and night. The drying operation [144] lasts five days, and during the first days the tobacco is turned over several times on the wattles.

[804] After this treatment it is rolled into egg-shaped balls which are strongly compressed by hand and weigh from 100 to 150 grams each. It is then put into cylindrical baskets which are lined inside with dry leaves or bamboo leaflets.

Each basket contains one "mun" or one-fifth of a picul (12.2 kilograms), and the tobacco is sold and exported in this form and in this kind of package.

249 It is reckoned that about 100 tobacco plants are needed to supply one "mun" of cut tobacco, and this would mean, in accordance with what has been said above, a yield of 1,800 to 3,000 kilograms per hectare.

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APPENDIX XXIV
NOTE ON SERICULTURE

231 178 It would appear that sericulture was once one of the most active branches of the country's industry. It must even have been quite extensive, if we are to rely on the sayings of the older folk who deplore its present decline.

231 Today the production by this entirely familial breeding industry is not as great as it used to be and its quality leaves much to be desired, as does the general yield from the silkworms. This decline stems both from certain unfavorable climatic conditions and from a defective food supply for the worms resulting from the poor state of mulberry tree cultivation.

Since the temperature in places where there are silkworm breeding houses never falls below a certain point, except perhaps during a few nights in the cold season, there can be no wintering for the silkworms. As a consequence there is never any stop to the fecundation, egg-laying, incubation, hatching and rearing of the worms, and all these operations can be carried out continuously all year long.

Under such a regimen it is not surprising that the native varieties of silkworms should degenerate and produce only a mediocre and [illegible] scanty yield. From the point of view of breeding returns, there are considerable losses. Thus if eight females lay 2,500 to 3,000 eggs, for example, these will yield only 250 or 300 worms; and only half of the latter, that is to say about 125 or 150, will reach a final stage of development and spin a cocoon. This return amounts to only ten percent of the eggs placed in incubation and fifty percent of the worms subsequently hatched.

Fecundation and egg-laying. The male and female insects which have been selected and chosen for reproduction are mated for fecundation. Afterwards the females are separated from the males, which serve no further purpose, and placed in groups of six or eight on a small square of cottonstuff which is covered with an ordinary porcelain bowl. [146] The females lay their eggs, and when they have done so some 2,500 or 3,000 eggs are found on the

283 231 together with the aid of a slotted thread gauge to produce one thread of raw silk. Tension on the strands is provided by hand as they are wound, and the thread is wound on the drum of the reel. From this process there results an uneven thread with many nodosities, especially in the case of the third-grade thread which comes from the cocoon floss.

[147] **Production.** Fifty cocoons usually produce 2.25 grams of raw silk. This includes three different grades, in the following proportions:

1. First grade, glossy, fine and regular silk: 25 centigrams;
2. Second grade, less glossy silk, semi-fine and fairly regular: 50 centigrams;
3. Third grade, dull, coarse and irregular silk, 1.5 grams.

It is reckoned that 2,000 to 2,500 cocoons are required on the average to produce one kilogram of silk.

In summary, 800 raw and empty cocoons weigh 100 grams. When reeled off these 800 cocoons yield only 36 grams of silk. Thus there is a loss of 64 grams, representing 64 percent of the weight of the cocoons and thereby constituting a waste product composed of unwindable fragments, whereas the amount which can be utilized is only 36 percent (1).

(1) Report by P. Macey.

[148]

APPENDIX XXV
NOTE ON THE CULTIVATION OF OPIUM POPPIES

249 Poppies are grown in all the high regions inhabited by the Meos and especially in the north of Upper Laos. But the latter scarcely grow any but the amount which they themselves need each year, and are content merely with selling their surplus, if there is any.

Their method of cultivation is extremely primitive. They begin by burning the trees and brush in order to clear the soil, then spade up the ground to a depth of about five centimeters and sow the seed in the first two weeks of September. They try to choose hillsides which are exposed to the rising sun, and do not irrigate the land.

If rain is plentiful they obtain one or two capsules per plant by this manner, on the average. If rain is scarce, then the yield is nil. They do not use any kind of fertilizer.

Poppies thrive especially in clay soil with a substantial sound

249 understratum. The land must be watered towards the end of October, after the rainy season, if a good yield is to be obtained. Various fertilizers, barn manure, ashes and lime are also necessary.

It will be difficult to induce the natives to use these methods of cultivation. Only Frenchmen who already have some knowledge of agriculture will be able, within the immediate future and with the help of the administration, to transform the cultivation of opium and obtain good results. Then Indo-China will produce the opium which it needs for its own consumption and will no longer be dependent on India.

The trials which I have just completed at Phou-Wai-Som are conclusive, and yet I was unable to obtain a yield which was proportionate to the money I spent because of an exceptional drought which almost dried up the springs. One thing is sure, however: the poppies which could be sufficiently watered gave [149] good results. The natives whose fields lay near my plantings were astounded at the yield I obtained, whereas they themselves, over an extent of six villages and a larger area of ground, harvested barely 100 grams of opium.

The most favorable season for sowing is from September 15 to November 15.

I tried different types of seed. All of them--the white poppy from France, the one from India, the one from Laos and the Burmese opium poppy--were entirely successful. The stalks reached a height varying between a meter and a meter and a half, and each plant produced from one to sixteen capsules.

To achieve this result the ground must be spaded up to a depth of about twenty-five centimeters. On this should be spread forty cubic meters of barn manure per hectare, mixed with lime and ashes if possible, then the soil should be plowed a second time and leveled. Next the field is divided into lands 1.2 meters wide which are separated by small irrigation canals communicating with the other water supply canals.

With the soil thus prepared, the seed is sowed broadcast at the times already indicated, and at the rate of three kilograms of seed per hectare.

The poppies sprout eight or ten days later, and when they are five centimeters above ground the weeds have to be removed and the plants thinned so as to leave a space of ten centimeters between each plant. Two weeks later the plants are thinned again and the intervals increased to 25 or 30 centimeters, depending on the strength of the

249 plants. Then the soil is given a second dressing.

Up to the time when the stalk reaches a height of twenty centimeters, the poppy is often attacked by a worm which eats it either at ground level or a little below. It can easily be discovered buried in the soil near the stricken plant, and it is essential that the worm be destroyed. Whenever the surface of the soil is dry around the plants, it will be well to water the ground and thereby prevent these worms from hatching. At flowering time, that is to say three months after sowing the seed, the leaves are devoured by caterpillars. Sometimes also a small toadstool forms at the foot of the plant. These parasites are caused by soil that is too damp. It is then best to uproot the contaminated plants and drain the field, for although the poppy is fond of water it does not like to remain in it, and if forced to do so may suddenly wither away.

249 276 When the petals will come off easily and almost by themselves, they should be removed, sorted into packs, and dried by exposing them in a well-aerated and very dry place. From time to time care should be taken to turn them over and remove those which are mouldy. These petals will be used to wrap balls of opium.

276 A few days later when the capsules have become somewhat harder, they are [150] scarified with a knife which has a rectangular blade and is placed so as to make four shallow incisions at the same time on the capsule walls, but affecting only the epidermis. The opium is at once exuded in the form of small drops which remain glued to the skin until the following day. In the morning after the dew the opium is collected with a scraper, then placed in a container and taken to the drying room. This operation is repeated each day until the end of the harvest.

If scarification is done in rainy or misty weather, it sometimes happens that after the opium is collected a blackish liquid forms which is rather like very strong coffee. This has to be carefully removed, or the quality of the opium will suffer. But since it is easy to recognize in advance, for the opium is laden with water, it is better then to convert it into chandoo which will be used as paste in wrapping the balls. When the west wind blows, as very frequently happens in Laos, this phenomenon does not occur.

The natives do not by any means take all these precautions, however, and so the opium which they produce is of inferior quality.

Each day the opium is stirred, either in the open sun or in a spot which is under cover but well aerated and very dry. It is worked in this manner until it reaches the desired consistency, then it is